

LIST OF CURRENT CLAIMS

1.-17. (Cancelled)

18. (New) A dynamic speed limiter for a compressor having a compressor element with a gas inlet and a gas outlet, a temperature sensor arranged to determine the outlet temperature in the gas outlet, a speed sensor arranged to determine the rotational speed of the compressor element, a motor driving the compressor with adjustable speed, and a speed control device for the motor, the dynamic speed limiter comprising:

a hysteresis module coupled to the speed control device and to the temperature and speed sensors,

wherein the hysteresis module is configured with a hysteresis upper temperature limit, a hysteresis lower temperature limit, and a permitted maximum speed range including a minimum rotational speed and a maximum rotational speed,

wherein upon detecting from the temperature sensor that the hysteresis upper temperature limit of the outlet gas has been reached, the hysteresis module is configured to lower the rotational speed of the compressor element by a speed change via the speed controller when a measured rotational speed of the compressor element is in a high speed range approximately at the compression element maximum rotational speed, and

wherein upon detecting from the temperature sensor that the hysteresis lower temperature limit of the outlet gas has been reached, the hysteresis module is configured to increase the rotational speed of the compressor element by a speed change via the speed controller when the measured rotational speed of the compressor element is in a low speed range approximately at the minimum rotational speed.

19. (New) The dynamic speed limiter according to claim 18, wherein the hysteresis upper temperature limit is lower than a maximum critical threshold value of the outlet temperature above which compressor damage can occur.

20. (New) The dynamic speed limiter according to claim 18, wherein, upon detecting from the temperature sensor that the specified hysteresis lower temperature limit of the outlet gas is reached, the hysteresis module is configured to lower the rotational speed of the compressor element via the speed controller device when a measured rotational speed is in an upper speed range approximate to the maximum compressor element rotational speed, and wherein the hysteresis module is configured to raise the rotational speed of the compressor element when the measured rotational speed is in a lower speed range approximately at the compressor element minimum rotational speed.

21. (New) The dynamic speed limiter according to claim 20, wherein the hysteresis module is configured to affect the speed control device to enable the compressor element to operate in the maximum permitted speed range when it detects from the temperature sensor that the outlet temperature has reached the hysteresis lower temperature limit.

22. (New) The dynamic speed limiter according to claim 18, wherein the speed change is adjustable when the hysteresis upper temperature limit is reached.

23. (New) The dynamic speed limiter according to claim 20, wherein the speed change is adjustable such that a resulting decrease of the outlet temperature is smaller than the difference between the hysteresis upper temperature limit and the hysteresis lower temperature limit to avoid cyclic instable behaviour of the rotational speed of the compressor element.

24. (New) The dynamic speed limiter according to claim 18, wherein the hysteresis module is configured to receive a measurement of the outlet temperature with a certain periodicity.

25. (New) The dynamic speed limiter according to claim 24, wherein the hysteresis module is configured such that the periodicity of the measurements of the outlet temperature is increased when the outlet temperature exceeds the hysteresis upper temperature limit.

26. (New) The dynamic speed limiter according to claim 20, wherein the hysteresis module is configured such that an increase of the rotational speed resulting from the hysteresis upper temperature limit being detected in the lower speed range of the compressor resulting in an increase of the operational pressure, results in an automatic idle condition of the compressor element and an automatic stop/restart mode of the compressor element, without switching to an unwanted stop mode with alarm and manual re-start.

27. (New) The dynamic speed limiter according to claim 18, wherein the control device for the motor includes at least one safety device in order to prevent extreme conditions.

28. (New) The dynamic speed limiter according to claim 18 configured to operate the compressor optimally with a speed ratio larger than 2.5.

29. (New) The dynamic speed limiter according to claim 18, wherein a maximum critical threshold value of the outlet temperature is adjustable between 150°C and 350°C.

30. (New) A method for controlling a compressor having a dynamic speed limiter for a compressor having a compressor element with a gas inlet and a gas outlet, a temperature sensor to determine the outlet temperature in the gas outlet, a speed sensor to determine the rotational speed of the compressor element, a motor with adjustable speed driving the compressor, and a speed control device for the motor, comprising:

providing the dynamic speed limiter with a hysteresis module, the hysteresis module being coupled to the speed control device and to the sensors for the outlet temperature and the rotational speed;

detecting the gas outlet temperature of the compressor element;

configuring the hysteresis module with a hysteresis upper temperature limit, a hysteresis lower temperature limit, and a permitted maximum speed range within a compressor element minimum rotational speed and a maximum rotational speed;

when the gas outlet temperature reaches the specified hysteresis upper temperature limit, causing the hysteresis module to lower the rotational speed of the compressor element via the speed control by a speed change when a measured rotational speed is in a high speed range approximately at the maximum rotational speed; and

when the gas outlet temperature reaches the specified hysteresis lower temperature limit, causing the hysteresis module to increase the rotational speed of the compressor element by a speed change when the measured rotational speed is in a low speed range approximately at the minimum rotational speed.

31. (New) A dynamic speed limiter for a compressor having a compressor element with a gas inlet and a gas outlet, temperature a sensor arranged to determine the outlet temperature in the gas outlet, a speed sensor arranged to determine the rotational speed of the compressor element, a motor driving the compressor with adjustable speed, and speed a control device for the motor, the dynamic speed limiter comprising:

a hysteresis module coupled to the speed control device and to the temperature and speed sensors,

wherein the hysteresis module is configured with a hysteresis upper temperature limit, a hysteresis lower temperature limit, and a permitted maximum speed range including a minimum rotational speed and a maximum rotational speed,

wherein upon detecting from the temperature sensor that the hysteresis upper temperature limit of the outlet gas has been reached, the hysteresis module is configured to lower the rotational speed of the compressor element by a speed change via the speed controller when a measured rotational speed of the compressor element is in a high speed range approximately at the maximum rotational speed;

wherein upon detecting from the temperature sensor that the hysteresis lower temperature limit of the outlet gas has been reached, the hysteresis module is configured to increase the rotational speed of the compressor element by a speed change via the speed controller when the measured rotational speed of the compressor element is in a low speed range approximately at the minimum rotational speed; and

wherein the hysteresis module is further configured with a memory for storing gas outlet temperature curves representing the outlet temperature as a function of the rotational speed of the compressor element and the hysteresis upper and lower temperature limits, and a speed jump for the rotational speed that is effected when the hysteresis upper or the lower temperature limit is reached.

32. (New) The dynamic speed limiter according to claim 31, wherein the hysteresis module is further configured to determine from the speed sensor whether the rotational speed of the compressor element is situated in the low speed range or in the high speed range in order to effect the correct speed adjustment when the hysteresis upper temperature limit is reached.

33. (New) The dynamic speed limiter according to claim 31 further comprising a memory configured to provide an automatic re-start at a same speed as when the compressor was running idle before.

34. (New) The dynamic speed limiter according to claim 24, wherein the hysteresis module is configured to receive a measurement of the gas outlet temperature at least once per minute.

35. (New) The dynamic speed limiter according to claim 18, wherein the hysteresis module is configured to receive a measurement of the gas outlet temperature continuously.

36. (New) The dynamic speed limiter according to claim 28, wherein the dynamic speed limiter is configured to operate the compressor with a speed ratio between 2.7 and 3.5.

37. (New) The dynamic speed limiter according to claim 29, wherein the maximum critical threshold value of the outlet temperature is adjustable between 200°C and 300°C.

38. (New) The dynamic speed limiter according to claim 19, wherein the hysteresis upper temperature limit is less than the critical maximum threshold value by 2°C or less.